PIANC
The World Association for Waterborne Transport Infrastructure

InCom WG 197

Small Hydropower plant in Waterways

Terms of Reference

1. Background

Small hydropower technologies have significantly developed during the last years. New hydraulic turbines (e.g. STEFF-turbine, VLH-turbine) or kinetic turbines (e.g. TREK-turbine, Smart-hydro-power-turbine, KSB-turbine) were developed. New hydropower technologies were especially developed for lower fall heads (e.g. Very-Low-Head-Turbine (VLH)) and lower discharges. Hydropower is very climate friendly due to missing production of carbon dioxide, no waste, efficient use of the natural water cycle and a relevant contribution to future renewable energy production. In addition, more efficient and fish friendly devices were developed to reduce impacts on migrating fishes. Small hydropower can be used along waterways in combination to navigation. So far, no guidelines or recommendations are available on how and under which circumstances to use small hydropower in inland waterways.

When planning small hydropower plant, the global economy (CAPEX, OPEX,...) of a waterway infrastructure including lock, movable weir and fish passes, must be considered at the conceptual design stage.

2. Objectives

The main goal of the WG is to develop a guideline concerning the best practice how to use the energy with small hydropower in inland waterways. Adding small hydropower technologies in the context of a waterborne transport infrastructure (WTI) plan can create benefits to the WTI project owner if this opportunity is taken into consideration in the very early planning stages. Furthermore it can become a win-win situation together with the hydropower stakeholders if those are using the opportunities of the WTI project planning for their interests.

The objective of this working group is to compare current practices of:

- Small hydropower technologies (including “run of the river” system)
- Integration of hydropower in waterways including interaction with navigation aspects
- To allow navigation authorities to assess hydropower potentials along an inland waterway including the impact of a hydropower device on environmental, economic and management aspects (we means “how is the energy used?” , internal use, sell to electric company, or directly produced by an electric company (contract for 30 years), ...)
- Summary of best practice examples to help designers, authorities and other relevant institutions
- and to give recommendations for common practices, where these would be helpful.

This working group seeks to gather input from a wide variety of waterway managers, hydropower producers, consultants and organizations (such as public administration, electric company or a mix of both through PPP).

Hydropower devices for maritime waterways will not be in the focus of this working group.

3. Earlier Reports and Concurrent Working Group Activities

PIANC InCom, MarCom, EnviCom, and RecCom Commissions, as well as other entities, have several Working Groups and Task Groups related to the subject. The following past and present related subjects and Working Groups are:

InCom

- Design Guidelines for Inland Waterways — PIANC WG 141
- Navigation Structures: Their Role within Flood Defence Systems – Resilience and Performance under Overloading Conditions — PIANC WG 137
- Fish Passage — PIANC WG 127

MarCom

- Renewals and Energy Efficiency for Maritime Ports — PIANC WG 159

EnviCom

- A Practical Guide to Environmental Risk Management for Navigation Infrastructure Projects — PIANC WG 175
- A Guide for Applying Working with Nature to Navigation Infrastructure Projects — PIANC WG 176
- Working Group on Climate Change Adaptation for Maritime and Inland Port and Navigation Infrastructure — PIANC WG 178
- Carbon Management for Port and Navigation Infrastructure — PIANC WG 188
- Guidelines for Sustainable Inland Waterways and Navigation — PIANC WG 6

4. Scope

Matters to be Investigated

- Overview of small hydropower devices including range of application, special requirements, boundary conditions
- Analysis of impacts of hydropower on waterways and vice versa.
- Review of environmental, economic and operational aspects of small hydropower along waterways,
- Interaction with fish passage, and fishing/angling issues is an essential element in some countries (UK, ..).
- Interaction with weir and sluice for navigation,
- Summary of state of the art examples

Outputs from the WG has to be specific to navigations and in my view that has to include the issues associated with fish passage around or through the turbines.

Method of Approach

Evaluation of existing small hydropower plans including technical, operational, economic and ecological impacts. This will include a list of available technologies and a list of practical examples.

5. Suggested Final Products

All results will be described in a published PIANC report and an associated with PIANC Project Reviews (saved on the PIANC web site). If practical and appropriate, participants will develop and distribute a technical brief containing main outcomes.

6. Recommended Members

We need a good balance of members from all stakeholders and of course from electric companies and IW organisations.

- Organizations representing Inland Waterway systems
- Members with an expertise in small hydropower plant
- Members with an expertise in fluvial hydraulics
- Members with an expertise on ecological impacts of hydropower (fish passes, fishing and angling)

7. Relevance for Countries in Transition (CiT)

Hydropower production is still not fully developed in CiT and many CiT still have enormous potentials for small hydropower. Therefore, the relevance of the proposed Working group is high for CiT.

8. Climate Change and Working With Nature

Hydropower in IW is fully integrated in the concept of "Working With Nature (WWN)" and is a significant contribution to renewable energy production without emissions of carbon dioxide. This WG fits with the issues developed by PIANC at the World Water Forum.